Epizoophytic Algae from Mollusks, Turtles, and Fish in Oklahoma

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A study of the algae of Oklahoma was begun in the summer of 1951 at the invitation of Dr. Carl D. Riggs, director of the University of Oklahoma Biological Survey, and has progressed through the summer of 1953 under the sponsorship of that organization. It became apparent very early in this study that certain aquatic or semi-aquatic animals are exceptionally good algal habitats in themselves. The dearth of information on the species of algae occurring on such substrates, as well as on the identity of such animals bearing algal growths, has made it apparent that much useful information might be obtained on the nature of these plant-animal relationships.

Collections of algae from aquatic snails have been made wherever these animals were encountered. During the summer of 1953, Glen R. Webb, studying mollusks of the Lake Texoma region, brought to my attention the dense and often characteristic algal growths on specimens of clams and snails among his collections from that region. A study of this flora has shown the growth forms of the plants to be characteristic of this habitat and that numerous genera and species, some apparently new, are included. It seems possible that some of these new species may be restricted to mollusks, or even to individual genera or species as seems to be the case

in certain algal-turtle relationships. There appears to be no information available in the literature on this subject.

Aquatic turtles have long been known for the association of algal floras attached to them, but little information on this has found its way into the literature. The two genera of algae commonly thought to be of characersitic occurrence on turtles are *Basicladia* and *Dermatophyton* (7). Allee, *et al.* (1) cite *Rhizoclonium* as an alga "found only on turtle shells." This is obviously in error, but may have been based on an identification since referred to the genus *Basicladia*. Walker, *et al.* (9) discuss this matter, but are in error in stating that "it is probable that most, if not all, of the algae on North American turtles are *Basicladia*," since Smith (7) includes *Dermatophyton*. Perhaps these authors overlooked these reports since the word "turtle" has not been included in the index of Smith's book.

Basicladia crassa Hoffman and Tilden was reported from Oklahoma by Leake (5) from a specimen of *Chelydra serpentina*. Another species, *B. chelonum* (Collins) Hoffman and Tilden, has also been listed as a state record (6). These are both filamentous and produce macroscopic growths.

Dermatophyton radians Peter, previously reported only from Massachusetts (3) and Kansas (8), has been found by the author on all species of Oklahoma turtles on which *Basicladia* too was found. It was also found on the softshell turtle, *Amyda ferox emoryi*, attached to the skin of the legs, but *Basicladia* has not been reported from this turtle. *Dermatophyton* is a pseudo-parenchymatous crust of cells which may reach a size of a few millimeters in diameter, but often is of such small size that a hand lens may be required for its detection. The thalli range from one to four or five cells in thickness.

Walker, *et al.* (9) listed only six definitely identified species of turtles reported having algal (*i.e., Basicladia?*) growths: *Emys blandingi, Chelydra serpentina serpentina, Stenotherus odoratus, Chrysemys picta marginata, C. p. belli*, and *Graptemys geographica.*

This list is here extended for turtles found in Oklahoma with the addition of three more: *Pseudomys scripta elegans* and *Graptemys pseudogeographica*, both bearing *Basicladia* spp. and *Dermatophyton radians*, and *Amyda ferox emoryi* bearing only *Dermatophyton radians.*

It is undoubtedly possible that other turtles from the state will be added to this list, and it seems also probable that additional algal species will be reported from turtles.

The occurrence of fresh-water algae epizoophytic on fish has been limited to date to one record of a single species, *Oödinium limneticum* Jacobs (4), a parasitic member of the dinoflagellates which includes the more animal-like algae. This species was recorded from nine species of fresh-water, exotic fish from an aquarium in Minnesota. Another species of this genus, *O. ocellatum* Brown, has previously been known from marine fish (2).

It is not to be expected that such normally holophytic organisms should be found to have taken up the parasitic habit to any great extent, and thus it was a bit startling to have discovered a growth of green algae attached to a fish from Lake Texoma. The fish, a largemouth black bass (*Micropterus salmoides*) was taken in June of 1953 by Al Houser who called the algae to my attention. The infection here consisted of a large patch (about 3/4 inch in diameter) of sessile filamentous green algae consisting of two genera: one, an apparently new species of *Cladophora* (family Cladophoraceae) comprised the more conspicuous part of the growth. The other was an as yet unidentified member of the family Chaetophoraceae. The former is characterized by its erect, freely branched habit, the latter by an erect, branched portion with a prostrate pseudoparenchymatous portion.

A second specimen of *Micropterus salmoides*, taken from Grand Lake in September of 1953, proved to have the same species of *Cladophora* attached on the forward portion of the maxilla. The growth here was also conspicuous, but without any other algal associate. A third occurrence of this alga is from the operculum of a smallmouth buffalo (*Ictiobus bubalus*), taken in August, 1953 from Lake Texoma, and again without other algal associates.

In all three cases the bone of the fish was deeply penetrated by the well-developed and much branched holdfast of the *Cladophora*. In the first case mentioned, this penetration was as much as 200 microns into the bone.

No information was obtained as to the effect of this algal growth on any of the three fish, but the epidermal areas surrounding the infections were obviously damaged, as a result of the growth or some injury previous to its invasion. It is of interest to note that the algae from the first fish specimen were cultured for over a month in distilled water, still attached to the bone, and that the growth of the algae was definitely appreciable even in the absence of light in a refrigerator.

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